

Claims

1. Dispensing system with at least one dispenser (1) for articles that are available to be dispensed, preferably in form of a mini bar, an administering system for billing dispensed articles and/or administering the stock of the articles to be dispensed, or at least an interface (6) to such an administering system, said dispenser (1) comprises at least one store area (3), said one store area 3 allows the simultaneous storing of several preferably different articles, whereby the articles can be removed and placed back after inspection by the customer without being charged for the selling price of the articles **characterised in that** the articles can be freely positioned on the store area (3), and in that said store area is monitored by a detection device which is able to detect at least after a certain time whether an article has been removed independently from the positions in said store area occupied by remaining articles and occupied formerly by said removed article, whereby said detection device comprises a detecting sensor arrangement (4) that generates a signal enabling to calculate the removal of the said removed article and a data processing (5) unit processing said signal by comparing it with stored data determining thus the removal of said removed article for the purpose of billing.
2. Dispensing system according to claim 1 **characterised in that** the detection device is able to detect additionally the identity of a removed article independently from the positions in said store area occupied by remaining articles and occupied formerly by said removed articles, whereby the sensor arrangement (4) comprised by the detection device generates a signal enabling to calculate the identity of said removed article and whereby the data processing unit (5) processes said signal which allows to calculate the identity by comprising it with stored data determining thus the identity of said removed article for the purpose of billing and/or administering the stock of articles.
3. Dispensing system according to claim 1 or 2, **characterised in that** the detecting sensor arrangement (4) generates in defined intervals a signal depending on the number or the number and/or the identity of the stored articles which is compared by the data processing unit to a prior signal produced by the sensor arrangement in order to determine whether at least one article has been removed in the meantime or to determine whether

at least one article has been removed in the meantime and, if so, in order to determine the identity of said removed article.

4. Dispensing system according one of the preceding claims, **characterised in that** the detection device is composed of a detecting sensor arrangement (4) comprising a store area (3) carried by a means for measuring (12) the load on the store area and a data processing unit (5) comprising means for comparing data of an actual load of the store area with data of a former load of a the store area and means for identifying the dispense of an article and/or the identity of a dispensed article by means of the load difference.
5. Dispensing system according to claim 4 **characterised in that** the means for measuring (12) the load on the store area comprises at least one piezo-electric load sensor bearing the store area (3) or at least one resistance strain gauge detecting the strain of an elements bearing the store area.
6. Dispensing system according to claims 4 or 5 **characterised in that** the store area is three point beared.
7. Dispensing system according to one of the claims 1 to 3 **characterised in that** the detection device is composed of a detecting sensor arrangement (4) comprising a pick-up equipment (13) that supplies a digital image of the store area (3) and the articles stored in the store area and a data processing unit (5) comprising means for comparing data of an actual image of the store area with data of a former image of the store area and means for identifying the dispense of an article and/or the identity of a dispensed article by means of the difference between the images.
8. Dispensing system according to claim 7 **characterised in that** the pick-up equipment (13) is arranged above the store area so that it pictures the store area and the articles stored in the store area from above.
9. Dispensing system according to claim 7 **characterised in that** the pick-up equipment (13) is remote and takes the pictures of the store area by means of a mirror system or a glass fiber optics.

10. Dispensing system according to one of the claims 7 to 9 **characterised in that** the detection device comprises a light source (15) illuminating the dispenser 1 in order to enable the pick-up equipment (13) to take a picture.
11. Dispensing system according to claim 10 **characterised in that** the light source (15) comprises one or more incandescent light sources, preferably one or more diodes or an array of diodes.
12. Dispensing system according to claim 10 or 11 **characterised in that** the light source (15) is arranged in such a way, that the illumination of the stored articles produces no shadowing which falsifies the recognition of the articles stored.
13. Dispensing system according to one of the claims 7 to 9 **characterised in that** infrared rays are used for taking a picture.
14. Dispensing system according to one of the claims 1 to 3 **characterised in that** the detecting device is composed of a detecting sensor arrangement (4) comprising a plurality of sources (16) emitting coherent light, preferably laser diodes, cooperating with an according number of light detectors (17), said light sources (16) and said light detectors (17) are arranged in such a manner that the stored articles create a shadow image and a data processing unit (5) comprising means for comparing data of an actual shadow image with data of a former shadow image and means for identifying the dispense of an article and/or the identity of a dispensed article by means of the difference between the shadow images.
15. Dispensing system according to claim 14 **characterised in that** said sources (16) emitting coherent light and said light detectors (17) are arranged in such a way that at least one light curtain is formed.
16. Dispensing system according to claim 15 **characterised in that** a plurality of light curtains arranged in different planes is formed.

17. Dispensing system according to claim 16 **characterised in that** the planes of the light curtains are approximately parallel to the surface of the store area.
18. Dispensing system according to claim 16 **characterised in that** the light beams of at least one light curtain are approximately perpendicular to the light beams of at least one other light curtain.
19. Dispensing system according to claim 15 to 18 **characterised in that** at a plurality of light curtains are provided in a number of different planes, said planes approximately perpendicular to the surface of the store area (13).
20. Dispensing system according to one of the claims 1 to 3 **characterised in that** the detecting device is composed of a detecting sensor arrangement (4) comprising a magnetic field scanner loop which is able to detect a magnetic label attached to the individual article when the article passes said scanner loop and a data processing unit (5) which processes the signal of the magnetic field scanner loop.
21. Dispensing system according to one of the claims 1 to 3 **characterised in that** the detecting device is composed of a detecting sensor arrangement (4) comprising a Radio Frequency Identification scanner (RFId-scanner) which is able to communicate with transponder labels (smart tags) attached to the articles to be dispensed and a data processing unit (5) which processes the signal of the RFId-scanner.
22. Dispensing system according to claim 21 **characterised in that** the store area and the RFId-scanner are surrounded by a housing (2) with a door opening and a door (2a), whereby said housing (2) and said door (2a) radioshield the RFId scanner as soon as said door is closed.
23. Dispensing system according to claim 21 or 22 **characterised in that** the RFId-scanner is mounted close to the opening of the housing so that each smart tag that passes the opening compellingly enters into communication with the RFId-scanner.

24. Dispensing system according to one of the claims 1 to 3 **characterised in that** the detection device comprises a combination of two or more different detection devices with according detecting sensor arrangements chosen from the five groups of the claims 4 to 6 (load detection), 7 to 13 (screening by full image), 20 (magnetic detection), 14 to 19 (screening by shadow image) and/or 21 to 23 (tagging), whereby the combination preferably comprises detection device chosen from the group of the claims 4 to 6.
25. Dispensing system according to one of the preceding claims **characterised in that** the dispenser (1) comprises a plurality of store areas (3) not divided into separated compartments whereby two or more or all store areas (3) are monitored by a common detecting sensor arrangement (4) according to one of the claims 4 to 24.
26. Dispensing system according to one of the preceding claims **characterised in that** the data processing unit (5) comprises a local data processing unit (5c) directly assigned to each dispenser and a central data processing unit (5f) remote from said at least one dispenser (1).
27. Dispensing system according to claim 26 **characterised in that** the data processing unit (5) comprises an intermediate data processing unit (5e) that is remote but preferably in the vicinity of said at least one dispenser (1) and that is remote from the central data processing unit (5) and that receives data from the at least one dispenser (1), preferably from a group of dispensers (1) in the vicinity, and that forwards said data or data calculated from said data to the central data processing unit (5f).
28. Dispensing system according to claims 26 or 27 **characterised in that** the local data processing unit (5c) assigned to each dispenser comprises at least means for processing the signals received from the detecting sensor arrangement (4) of the assigned store area (3) into a suitable form for onward transmission of data to the intermediate data processing unit (5e) or to the central data processing unit (5f).

29. Dispensing system according to one of the claims 26 to 28 **characterised in that** the detecting sensor arrangement (4) is not continuously operated but from time to time.
30. Dispensing system according to claim 29 **characterised in that** said local data processing unit (5c) comprises a trigger means for triggering a detecting cycle of the detecting sensor arrangement.
31. Dispensing system according to claim 30 **characterised in that** the trigger means is a means which registers the access to the dispenser, preferably a door sensor or switch (8, 9) and/or a light barrier and/or a motion sensor and/or a load detecting sensor (12) assigned to the store area and/or a timer that triggers the detecting cycle from time to time.
32. Dispensing system according to claim 30 or 31 **characterised in that** said detecting cycle is not carried out immediately upon triggering by said switch, said barrier or said sensor but after lapse of a predetermined time after triggering.
33. Dispensing system according to one of the claims 26 to 32 **characterised in that** said at least one local data processing unit (5c) comprises additional means for detecting whether there is a difference between a signal newly generated by the detecting sensor arrangement (4) and a signal previously generated by the detecting sensor arrangement (4), means for deciding whether the difference is relevant so that it is required to forward data to the intermediate or the central data processing unit (5e, 5f) or not.
34. Dispensing system according to claim 33 **characterised in that** said at least one local data processing unit (5c) forwards, in case of a relevant difference, data to the intermediate or the central data processing unit (5e, 5f) which enables the intermediate or the central data processing unit (5e, 5f) to determine whether an article has been dispensed or not and, in case of dispense, the identity of the dispensed article.
35. Dispensing system according to claim 33 or 34 **characterised in that** said at least one local data processing unit (5c) forwards, in case of no relevant difference, a signal "no change since last interrogation".

36. Dispensing system according to claim 33 to 35 **characterised in that** said local data processing unit (5c) stores the data to be forwarded until interrogated by the intermediate or the central data processing unit (5e, 5f).
37. Dispensing system according to claim 33 to 35 **characterised in that** the intermediate data processing unit (5e) stores the data to be forwarded until interrogated by the central data processing unit (5f).